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VIEWS, NEWS AND INTERVIEWS.

Mr. R. Coupland Harding, of Wellington, New Zealand, is publishing a penny illustrated weekly—political, literary and humorous — entitled *X Rays.*

Ex-Mayor Schieren, of Brooklyn, N. Y., is quoted in a recent interview as follows:

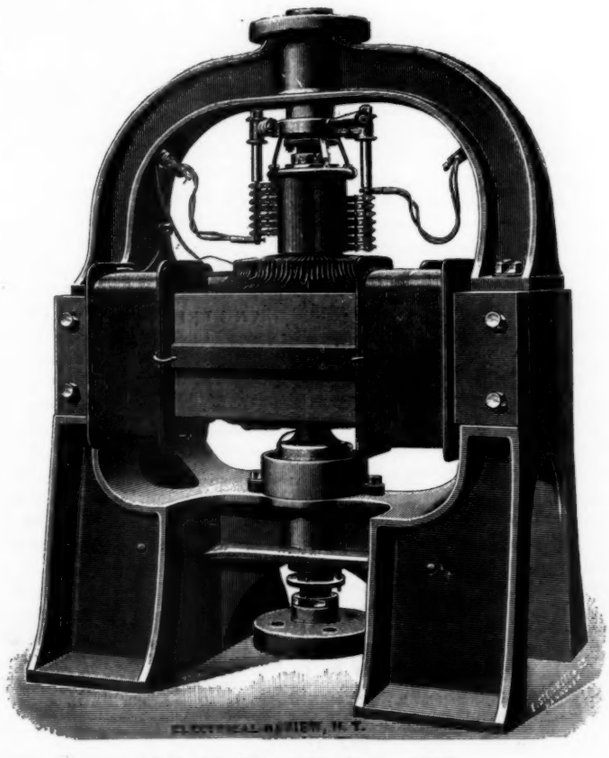
"Budapest is a model city in reference to her street railway system. She has no overhead wires, and still has swiftly moving electric surface cars. On one line the power is supplied by an extra rail, and on another by the storage battery system. Both are well out of the experimental period and have proved that they are successes. I must state here, however, that their cars are neither as comfortable nor as nice looking as street cars in this country. There is also an underground electric railway that is one of the features of the city. The tunnel is lined with glazed pressed brick, and is illuminated at frequent intervals, so that the entire trip is pleasant, and one scarcely realizes that he is traveling underground. Our elevated railroad people would do well to send a commission to investigate the underground road in Budapest. In reference to speed, the cars are propelled at any speed desired, and I rode at a much faster rate than I ever did on an elevated road in this country. The light and cleanliness of the underground road in Budapest are in marked contrast to the smoke and darkness of the one in London."

We have most of us heard of the curious mistakes which are sometimes made with the best intentions, by counsel engaged in technical cases, but the following is, I think, new, says a writer in London *Lightning.* A man was being sued in the county court for the price of two arc lamps and 50 pairs of carbons, and the plaintiff was under cross-examination as to the quality of the carbons. Suddenly the counsel thought he had elicited an important point, and, turning to the judge with a triumphant sweep of his arm, exclaimed: "But, your honor, we contend that the carbons supplied by the plaintiff are no good. *They are continually burning away!*" [Verdict for plaintiff, with costs.]

"On entering our office one day last month, just as we were about going to press, we found the card of Mr. Fred DeLand, editor of the *Electrical Engineering Magazine.* Our heart's desire is to see a live editor of one of the great electrical journals of the country, and we regret that our eyes were not satisfied; but the next time Mr. DeLand passes this way, we hope to have an opportunity of seeing him." Thus speaks the editor of the Kansas City *Architect and Builder.* May his "heart's desire" yet be realized, for he evidently knows who constitute the great men of the country!

Motor for Driving Centrifugal Pump.

The accompanying illustration, from London *Engineering*, shows one of a set of eight electric motors constructed by Messrs. Ernest Scott & Mountain, Limited, of the Close Works, Newcastle-on-Tyne, for driving the centrifugal pumps used for clearing the water from a large floating dock. As will be seen, the armature axis is placed vertically, being fitted with a coupling below to bolt on to another flange on the pump spindle. The field magnets are bolted to a heavy cast-iron standard, which also supports the bearings of the armature spindle. The commutator is located on the upper portion of the machine, being, therefore, easily accessible. The motors are designed to run at 350 revolutions per minute, at which they develop 60 effective horse-power.



Motor for Driving Centrifugal Pump.

Storage Batteries for Motor Carriages.

The Sola-Headland accumulator has been described in London, having been demonstrated to a representative of a daily paper there, apparently by no less a person than Mr. Spagnoletti himself. The invention is yet one more new form of grid. "The plates are made up of leaden bars, into which the active material is pressed, and, from the construction of these bars, it becomes practically impossible for the paste to drop out. Equal surfaces being exposed on four sides to the action of the current, buckling of the plates is avoided, even on the severest test of short-circuiting the cells. This feature renders it unnecessary to employ the large amount of lead hitherto required to give the older form of plates the strength necessary to stand the heavy strain of traction work. The cells thus equipped, presenting the largest possible surface of active material to the action of the current, are consequently much smaller for a given capacity than any other on the market, and a saving in weight of over 50 per cent has been effected."

The London Electric Omnibus Company have fitted their electric cart with it.

European Electric Railways.

There are now 560 miles of electric railway in Europe, an increase of 125 miles in one year. The number of electric cars has increased from 1,236 to 1,747 in the same time. Germany has 250 miles of electric railway and 857 motor cars; France has 82 miles and 225 motor cars; Great Britain has 65 miles with 168 cars, and Austria-Hungary has 45 miles with 157 cars. Next come Switzerland, Italy, Spain and Belgium, in the order given, while Russia has but one electric line with six miles of track and 32 motor cars. Portugal ends the list with one and seven-eighth mile. Of the 111 European lines, 91 are overhead trolleys, of which there are 35 in Germany, 12 in Switzerland, 10 in France, 7 each in England and Italy and 6 in Austria-Hungary, etc.

Of electric railways with underground current there were but three at the beginning of this year, one each in England, Germany and Hungary.

Nine lines are provided with an insulated central track, through which the current is conducted, eight of these lines being in Great Britain and one in France. The remaining eight lines are provided with accumulators. Of these, four are in France, two in Austria and one each in England and the Netherlands.

Variety Actors Shocked.

Two performers at a variety theater in Brooklyn, N. Y., received an electric shock one night last week that they will remember for sometime to come. The actors go by the names of Constantz and Ida, and a part of their turn is done with an electric bicycle.

The current is conveyed to the bicycle from the wings by means of wires that are invisible to the audience. One of these wires became exposed and wrapped about the performers. The strength of the current was that of the ordinary electric light service. The shock threw them to the stage and caused the woman to scream. Hearing this, stage hands ran in and helped them to the flies. An ambulance was called, but, after the surgeon had treated them, they were able to leave for home unattended.

Foote, Pierson & Company Buy the E. S. Greeley & Company's Manufacturing Department.

Foote, Pierson & Company sent out the following announcement on December 8:

"We beg to inform you that we have purchased the entire manufacturing department formerly owned and operated by the E. S. Greeley & Company, 5 and 7 Dey street, New York, with whom we have been associated for the last 25 years in that department, and have removed same to 82 and 84 Fulton street, where we will continue the manufacture of all electrical instruments and supplies formerly manufactured by that corporation, giving particular attention to the designing and building of special electrical apparatus."

The new firm is composed of Messrs. G. L. Foote, H. G. Pierson and Charles Freemann.

A New Catalogue of X-Ray Apparatus.

The Central Electric Company has just issued catalogue No. 40, describing and illustrating a complete line of X-ray apparatus carried in stock by this house. Everything necessary for X-ray work is mentioned in the pamphlet, which also contains some unusually fine reproductions of radiographs made with the Central Electric Company's apparatus.

Mr. William J. Fransioli has been appointed general manager of the Manhattan Railway Company, of New York city, of which he has been acting manager since the death of the late Col. F. K. Hain. Mr. Fransioli has been in the service of the company for about 15 years, and was Colonel Hain's assistant during the last five years of the latter's service.

Electric Railways.

The property of the Savannah, Ga., Electric Railway Company is advertised for sale on January 5.

The Chicago City Council has referred to a committee the application of the General Electric Railway Company for franchises on a large number of streets.

The General Electric Railway Company, of Chicago, has filed a mortgage for $3,000,000 with the Title Guarantee and Trust Company, of Chicago, as trustee for the State Trust Company, of New York.

It is stated that a dividend may be declared on the stock of the Kings County Traction Company, which was incorporated in March last to take over the assets of the Brooklyn, N. Y., Traction Company.

The Nassau Street Railway Company, of Brooklyn, is having its lines equipped with the electric heater known as "Electrotherm," manufactured by the H. W. Johns Company. It is giving great satisfaction to the patrons of this line, who are glad to see this sign of progress on the part of the management of the Nassau company.

An effort is said to be making, or at least in contemplation, to reduce the bonded obligations of the Metropolitan Elevated Railroad, of Chicago. The authorized bonded obligation is $15,000,000, and the amount outstanding is $10,000,000. The plan is understood to be for bondholders to surrender 50 per cent of their holdings for preferred stock. The Construction Company, which holds $6,500,000 of its bonds, is said to favor the plan.

The Electric Street Railroad, of Lima, Ohio, which was recently purchased by Cleveland capital, has been turned over to the new owners. The following officers were elected: President, E. W. Moore, of Cleveland; vice-president, Edwin Stone, of Bedford, Me.; general manager, C. Curry, of Lima, Ohio; and N. A. Gilbert, of Cleveland, and S. L. Catlin, directors. The new owners will make a number of improvements at once, and after putting the line in good shape, will add several miles to the system and put on additional cars.

Col. C. M. McGhee, of New York city, has purchased the stock and bond holdings of Inman, Swan & Company in the electric railway system of Nashville, Tenn. He is also reported to have secured, in association with Messrs. A. N. Shook, Nathaniel Baxter and J. W. Wrenne, of Nashville, the security holdings of Gen. W. H. Jackson in the same system, which will give the control of the system to him and his associates. A reorganization of the company is expected. It includes the entire street railway system of Nashville, with one comparatively small exception, and has about 60 miles of track.

There are now 560 miles of electric roads in Europe, an increase of 125 miles during the year. The number of cars has increased from 1,236 to 1,747. Germany leads with 250 miles of track and 857 cars; then come France with 82 miles and 225 cars, Great Britain with 65 miles and 168 cars and Austro-Hungary with 45 miles and 157 cars. Russia has one line with six miles of track and 32 motor cars. Of the 111 European lines, 91 are worked by the overhead trolley system; three, one each in Germany, England and Hungary, by an underground current; nine by an insulated central rail, and eight by storage batteries.

It is announced that the construction of the recently surveyed electric railway from Washington, D. C., to Gettysburg, by way of Frederick, Md., will be begun next Spring, or probably this Winter, if the weather will permit. The company is working under a charter known as the Baltimore & Washington Transit Company, and under this it has the right to construct and operate throughout the State of Maryland. Its capital stock is $1,000,000. This railroad has been duly organized, and $110,000 of its stock has been subscribed. The route, as surveyed from Washington, is via Takoma Park, Sandy Springs, Olney, Laytonsville, Frederick city, Hansonville, across the ridge to Thurmont, Emmittsburg and State line to Gettysburg.

A street railway company has been formed at Marlboro, Mass., to construct and operate a line, nine miles in length, connecting the present systems in Framingham and Marlboro, running through Southboro, capitalized at $100,000. The company will be known as the Framingham, Southboro & Marlboro Street Railway Company, and the directors are S. H. Howe, of Marlboro; F. D. Newton and C. B. Sawin, of Southboro; J. R. Entwistle, of Framingham; W. B. Ferguson, of Malden; C. E. Barnes, of Plymouth, and C. E. Dresser, of Leominster. The stockholders include the above, and M. F. Maher, of Framingham; C. W. Shippee, of Milford; W. S. Reed, of Leominster; Albert Stetson, of New York; J. H. Cunningham, of Chelsea; Frank E. Lowe, of Greenfield; A. B. Turner & Brother, of Boston; W. H. Gilman, of Boston.

The St. Anthony Falls Water Power Company.

A St. Paul press dispatch says that the Hon. Thomas Lowry is authority for the statement that the new Mississippi dam plant will furnish 10,000 horse-power with a full stage of water. He will use, according to his contract with the St. Anthony Falls Water Power Company, 4,000 horse-power for Minneapolis and 3,000 horse-power for St. Paul street-car lines, and the rest will be used in various industries.

Lord Kelvin and the X Rays.

In Mr. Edward P. Thompson's new book, entitled "Roentgen Rays and Phenomena of the Anode and Cathode," on page 25, appears the following under the heading of "McKay's Experiment—Magnetographs," dated April, 1896:

Although this experiment does not belong to that class connected with discharge tubes, yet the phenomenon has a theoretical interest in connection with X rays. He obtained a photograph of different objects in the dark by means of radiations from the poles of an electro-magnet after two hours' exposure, but it need not have been so long, as he obtained clear images in five minutes in one experiment, with frequent variations of current, by means of a rheostat, and by approach and recession of the armature. The elements involved in the experiment were arranged in the following order: First, a large inverted magnet for supporting 100 pounds, the poles hanging downward. Next in order was a wooden board pressing flatwise against the ends of the poles of the magnet. Next, the objects and the sensitive plates backed thereby and all inclosed in a completely opaque wrapping extending over the sides, face, back, etc., of these two elements. Next in order was an armature about as heavy as the magnet would support. The cut herein represents the photograph that was produced of the different objects named. By reading Professor McKay's very detailed description in the *Scientific American*, April 18, 1896, p. 249, the reader may feel certain that the photograph was not due to light, for he tried the experiments in different ways and with various precautions. In a course of experiments carried on by student Austin, about February 15, 1896, in the Dartmouth laboratory, a sciagraph of what appeared to be the lines of force was obtained by means of X rays, but upon repeating the experiment the result was negative.

The author sent a copy of his book to Lord Kelvin (Sir William Thomson) and received the following interesting reply:

I received it (the book) only a few days ago, but I have already looked nearly all through it, with great interest. I have seen enough to know that I shall find much most useful information in it which will be always readily available, because of the very excellent method and care with which you have given reference to authors, dates and publications, and I am sure all who are interested in the subject will find your book exceedingly valuable.

All your statements with reference to anything I have done on the subject are perfectly correct.

I believe that hitherto nothing in the way of diffraction has been discovered for the Roentgen rays.

I doubt very much the genuineness of Mackay's magnetographs (page 25 of your book). No other experimenter, so far as I know, has given any confirmation of his experiments. Believe me,

Yours truly,

KELVIN.

To-night (Wednesday) the American Institute of Electrical Engineers will discuss the science of X rays at its meeting, and as a number of prominent experimenters will be present, an unusually interesting evening is expected.

OBITUARY.

Charles F. Dilks, manager of the Postal Telegraph office in New Brunswick, N. J., died there on December 9 of heart disease. He was 52 years old, and was for many years in the employ of the Pennsylvania Railroad Company. He was associated for seven years with Thomas A. Edison and enjoyed his friendship up to the time of his death.

Mr. Whitney Condemns the West End's Subway Lease.

Mr. Henry M. Whitney, ex-president of the West End Street Railway Company, of Boston, is quoted by the Boston *News Bureau* as follows regarding the recent lease of the Boston subway by the West End Company:

"I regret that the matter of making any lease at all could not have been postponed until the value of the subway had been demonstrated by actual experience in the use of it. The city has undertaken to force a portion of the public travel into a channel which is entirely new. Compared with travel on the surface, travel in a tunnel or subway will always be unpopular.

"They have built a subway, a large portion of which is under water, or at least below the water line, without consulting the road as to routes or its method of construction. Connected with it are many problems as to whether it can be kept free from dampness, well ventilated, and whether its use will develop structural defects in it—all of which may materially affect its value, or absolutely destroy it.

"As the city has undertaken to force public travel into this new channel, it seems to me that it ought to take some, at least, of the responsibility in connection with the undertaking. By this lease, the West End not only undertakes to solve all these vexed questions, to put in pumping and ventilating apparatus and repair structural defects without any remedy whatsoever, but pays for the subway as much as any tribunal would adjudge it to pay, if after trial it proved to be successful in every particular, also popular. I can not see that the lease provides any adequate compensation for the assumption of this great burden.

"It seems to me that the time to make the lease would be when the city had worked out all the problems in connection with it and demonstrated its value.

"It is a fine thing for the city to get all its money back and take no chances on the whole enterprise; but I think it is a mistake for the road to assume all these in making a lease at the present time, when the question of its value is mere guesswork."

The West End Street Railway Company has leased the subway for a period of 20 years, paying as rental 4⅞% on the net cost of construction, providing the cost does not exceed $7,000,000. The railway is to keep a record of every car passing in either direction through the subway, and if, at a toll of five cents per car, this amount should exceed the 4⅞% rental, the excess is to be paid to the city. On this basis it is estimated that the subway would pay for itself in 40 years. Rentals are payable quarterly on the last days of December, March, June and September. The West End is to have the right to sublet.

Although the rental paid by the West End for the use of the subway may seem a considerable sum, it is figured that the subway will facilitate the operation of West End cars so as to permit a reduction in operating expenses throughout the whole line that will be compensatory for the expenses and rental of the subway. It is understood that while in other cities a street railway car makes from 90 to 100 miles every day, West End cars do an average of less than 70 miles per day, owing to the delays incident to the traffic in the crowded sections of the city.

A special meeting of West End stockholders, to consider the subway lease, was held yesterday, December 15, at noon. President Little is quoted as saying that the elevated railway company in Boston will have to lease the West End road if it wants to use the subway.

TELEPHONE NEWS AND COMMENT.

The Supreme Court of Missouri has ruled that a telegraph company is liable for mistakes made by it in the transmission of telegrams.

The Erie Telegraph and Telephone Company made a net gain of 128 subscribers in November, and 2,525 for the 11 months of 1896. Total number connected December 1, 21,116.

A meeting of the stockholders of the Home Telephone Company, of Fort Wayne, Ind., was held on December 7, and officers were elected as follows: Directors—S. M. Foster, Charles McCulloch, W. J. Vesey, C. F. Pfeiffer, Louis Fox, Charles S. Bash, C. D. Law, J. W. Sale, G. W. Beers. Officers were chosen as follows: George W. Beers, president; S. M. Foster, vice-president; Louis Fox, secretary; Charles McCulloch, treasurer. These officers, with W. J. Vesey, will constitute the executive committee of the directory.

Boston advices state that the Erie Telegraph and Telephone Company's gross income for 1896 will equal $1,200,000, an increase of $115,000 over 1895. The company's balance sheet, as of October 31, showed the following: Assets — 11,050 shares Cleveland Telephone Company; 24,010 shares Northwestern Telephone Exchange Company, and 19,600 shares Southwestern Telephone and Telegraph Company, $6,813,703; cash and accounts receivable, $526,821; total, $7,340,525. Liabilities—Capital stock issued, $4,800,000; six per cent bonds, 1909, $819,000; five per cent, 1926, $1,000,000; notes, $480,000; total, $2,299,000; reserved for interest to date, $18,429; reserved for dividend No. 52, $48,000; surplus, $175,095.

The "Niagara Type" of Porcelain Insulators.

The accompanying illustration is from a photograph showing the comparison between an ordinary derby hat and the porcelain insulators used on the electric transmission line between Buffalo and Niagara Falls. These insulators are known as the "Niagara Type," were designed by the White-Crosby Company, of New York city, builders of the line, and were made by the Imperial Porcelain Works, of Trenton, N. J. The base of the insulator is of an oval shape, 8½ inches wide the long way and 7½ inches wide the short way. The insulators are 5¾ inches high and weigh about 10 pounds each. In the illustration is also shown a section of one of the cross-arms used on the line, supplied by the Central Manufacturing Company, of Chattanooga, Tenn. The small insulator on the right of the picture is the ordinary "pony" glass insulator used for the private telephone line, which is carried on the same poles as the transmission line.

A Comparison of Size Between a Derby Hat and the Porcelain Insulators Used on the Buffalo-Niagara Falls Transmission Line.

As mentioned in the Electrical Review at the time the line was opened, the porcelain insulators were supplied by three firms. The best lot were those sent by the Imperial Porcelain Works, of Trenton, N. J.; but owing to the fact that this concern could not turn out enough insulators, made with the unusual care required for this special use, the product of two other companies was temporarily utilized until the Imperial Works could finish the order. Since the line was opened, a number of the insulators have broken down, and these have been replaced with the "Niagara Type." Eventually, the whole line will be equipped with this type, as manufactured by the Imperial Porcelain Works.

It may be well, in passing, to state that the hat shown in the picture is of the ordinary size, and does not belong to any one connected with the construction of this important and successful line.

Keewaten, Ont.—Mr. John Mathers, manager of the Keewaten Power Company, states that if the city of Winnipeg will contract to take the necessary power, the work of development of the power at Keewatin will be commenced without delay. The company have had in view for some time the erection of a large electric plant for generating and transmitting power to Winnipeg.

The Proposed Department of Commerce and Manufactures.

Edward A. Oldham, general manager of the Associated Trade and Industrial Press, Washington, D. C., has written the following communication to the Washington *Post*:

If there is one subject upon which the business interests of the whole country are united, it is that favoring the proposed new department of commerce and manufactures, a bill for which has been before Congress for sometime.

As there seems to be no cabinet position exactly to the liking of Mr. Mark Hanna, why wouldn't it be a good plan for the approaching session of Congress to proceed at once to create the new department of commerce and manufactures, so that the new cabinet position may be within the gift of President McKinley to bestow upon his able and distinguished friend and co-worker?

Mr. Hanna is distinctly a business man and manufacturer, probably the most notable exponent of the country's material interests before the public to-day. He is the very man to take the headship of a new department of the national government and launch it on its course, properly commissioned and equipped.

I trust that the *Post* will give publicity to this suggestion, which, I feel sure, will elict the cordial indorsement of every commercial and industrial organization in the country.

The Electric Appliance Company's Fifth Anniversary.

The Electric Appliance Company, of Chicago, have just completed their fifth business year, and are congratulating themselves on the results. They began business five years ago, at their present location, occupying a part of the first floor of the building at 242 Madison street, Chicago. Their business has increased, demanding greater facilities from time to time, until now they occupy the entire building, have a large basement and the three large upper floors filled with valuable stock, and are one of the largest electrical supply houses in the United States. Their supply line is very large and complete in every respect, and their line of specialties is one of the most desirable controlled by any supply house in the country. Their facilities for transacting a large volume of business, to the satisfaction of the trade and to their own profit, is unsurpassed. The Electrical Review congratulates the Electrical Appliance Company on their success, which is largely owing to progressive and up to-date ideas and business methods.

"Crescent" Brand Blue Vitriol.

The American Electrical Works, of Providence, R. I., are now making a first-class quality of sulphate of copper, or blue vitriol, under the name of "Crescent" brand. It is manufactured from the highest grade of copper, and, owing to its absolute freedom from iron, is especially designed and adapted for battery work. The American Electrical Works constantly carry a large stock on hand and will make prompt shipments. "Crescent" brand blue vitriol is packed in barrels weighing 400 pounds and half barrels weighing 200 pounds.

The Telephone and Election Returns.

[*From the Manchester, N. H., Union.*]

The recent political contest created an interest throughout the land the like of which has not been experienced since the memorable Lincoln campaign of 1860. The desire on the 3d of November to obtain the earliest possible details by which to gauge the sentiment of the country possessed almost every man and woman of intelligence, whether dwelling within the palatial confines of a New York residence or a cabin among the hills, far away from the strife and excitement of the political contest. Every one understood that the telegraph would tick the information from the Atlantic to the Pacific and from Maine to the Gulf of Mexico, as of yore, but that, in all probability, the destinies of the nation would not be determined by the early hours of the day following.

Few appreciate the magnitude of this system or the complexity of the machinery that is set in motion to gather up and disseminate this expression of the will of the 60,000,000 or 70,000,000 people scattered over a vast territory. The transposition of these results from the pen of the writer to the eye of the reader is mechanical. We know how type is set, how papers are printed and how distributed. It is very largely a mechanical operation, which a child can comprehend. The collection of the returns of Kickapoo, Arizona; Masardis, Maine; Laredo, Texas, and their dissemination among millions of people before they retire to the privacy of their homes, is another matter.

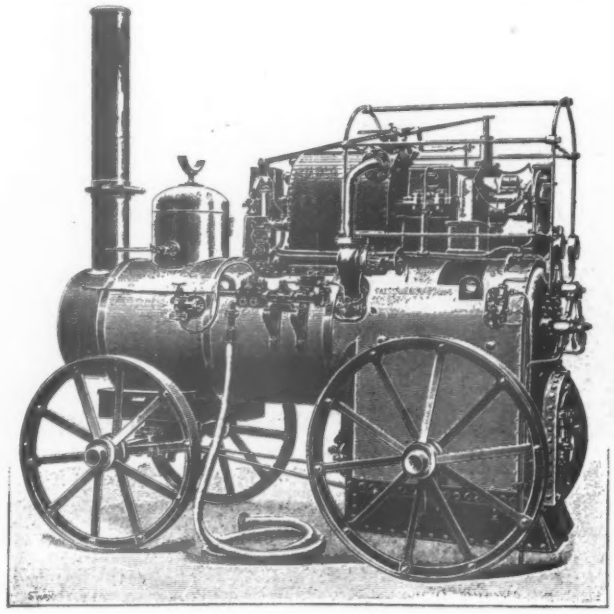
As an illustration of the availability of the telephone for this service, the results attending the collation of the returns of the State of Connecticut election night may be cited. There are within the State 168 cities and towns, of which number 19 are beyond the reach of electrical facilities and must needs be conveyed by team or messenger to the nearest point of transmission. Nevertheless, every city and town was heard from before midnight, with three exceptions, and these three, which were delayed by difficulties with the count, were received later and in time for issuance election night.

It is estimated that over 100,000 telephone subscribers received the returns in offices and residences, or an estimated audience of 500,000 people. It is no more difficult to talk from Boston, Mass., to St. Louis, Mo., 1,500 miles, than it is from the reader to his neighbor, but it costs more. The great interest in the recent contest induced the telephone magnates to throw open these great facilities to the general public, and thus it was that the news was, literally speaking, scooped up in this great telephone net and talked into one's ears from unexpected distances. It was a revelation to the public and to the great telegraph and news-gathering associations.

The result suggests a significant comparison with the 23,000 offices of the telegraph company, restricted in number and restricted in operation by skilled labor. Its elasticity is confined to the ability of its force to fill two places at once. The telephone, on the contrary, is possible of manipulation by every one, except they be deaf or dumb. Thousands transmitted the vote of the country townships that never operated a telephone, and thousands sat with their ear glued to the receiver the whole night long, hypnotized by the possibilities unfolded to them for the first time. It is a practical demonstration of the possibilities of one of the great inventions of the nineteenth century. If we can hear hundreds of thousands of people scattered over this broad land speak, why can we not in time produce other wonderful results now deemed impossible?

Parsons's Portable Turbo-Electric Generator.

The accompanying illustration,



PARSONS'S PORTABLE TURBO-ELECTRIC GENERATOR.

from London *Lightning*, shows the Parsons portable turbo-electric generator. It comprises a locomotive boiler and a steam turbine dynamo, mounted on a carriage for transport. This particular shape has been specially designed by C. A. Parsons & Company for the British Government, and is supplied for field service. It is, however, applicable to many other uses, and should exactly meet the wants of those who, for any purpose whatever, require a temporary installation of electrical light or power.

KIND WORDS.

FIRST QUALITY.

TO THE EDITOR OF ELECTRICAL REVIEW:

The ELECTRICAL REVIEW is very good. SCUDAMORE & COMPANY.

December 1.

Mr. H. N. Ransom, of the Consolidated Car-Heating Company, will make his office hereafter at 136 Liberty street, New York. Mr. Ransom is the efficient representative of the electrical department of his company.

Electricity in Mining and a Ten Per Cent Dividend.

At a meeting of the Rand Central Ore Reduction Company, held at Johannesburg recently, the treatment by the Siemens process of slimes which had hitherto been considered unworkable was favorably discussed. These slimes were now profitably treated, and the process was rapidly coming into general use. The various works on the Rand had a gross capacity for treating 21,000 tons of these slimes per month, and they had on hand tailings, slimes, etc., totaling about 1,500,000 tons. They were in negotiation for the erection of similar works in the Barberton district, and had entered into an agreement with a number of companies to treat their residuals. The success of their company was largely due to the Siemens–Halske process, which gave reliable results, and did not by incomplete precipitation make losses that could neither be accounted for, remedied nor recovered, as the zinc process so frequently did. The Siemens–Halske process did not depend upon chemical reaction, and it was not necessary to add chemicals to the solutions in order to get correct precipitation or better results; the simple application of the electric current was all that was necessary. A 10 per cent dividend was declared.

Helping the German Farmer.

The *Elektrotechnischer Anzeiger* describes an electric plow built by a firm of agricultural machine manufacturers in Halle. A 12-horse-power portable engine and dynamo generate the electricity, which is led to the twin-share tilting plow. The connection wires to the motor on the plow rest on supports, and their distance from the furrow is automatically maintained by the contact arm. The ends of these wires are connected through a cable cart to the dynamo. The dynamo delivers 25 amperes at 400 to 500 volts. The motor on the plow makes 500 revolutions, and drives a chain-wheel at 160 revolutions per minute. This chain-wheel works along a chain laid out in the field, as in the case of a steam plow. A furrow 10 inches deep and 400 yards long was cut in about six minutes. Three men are required to manage the apparatus, one sitting on the plow and the other two at either end of the furrow, to move the cable cart and the anchors which hold down the chain. The following proportional figures are given: Cost of working electric plow, 5.5; cost of working steam plough, 10; cost of working plow drawn by oxen, 12.5.

Chicago's Drainage Canal a Source of Electric Power.

The citizens of the enterprising city of Chicago are now considering the feasibility of using the water of the new drainage canal as a second Niagara for generating electric power. The *Tribune*, of that city, strongly favors the idea, and there seems to be no obstacle to the successful carrying out of the plan.

One of the engineers of the canal, Mr. Randolph, speaks enthusiastically of the project, as follows:

"I consider it altogether feasible and so promising in quick and lasting returns that I have no idea it will be postponed longer than finishing up the big canal," he said. "The whole canal extension can be finished in a year, or during the time which will elapse between the completion of the main channel and putting Chicago River in shape to discharge its waters through the canal.

"Now that the end seems in sight, the scheme is coming more and more into mind, and we are beginning to make calculations on it. Chicago, of course, will not halt upon an investment of $475,000 where there is certainty of earning such a big annual income.

"I find that between the 'tail-race' and the existing bed of the Desplaines River, and for a distance of about a quarter of a mile below the wire mills south of Lockport, there will be a difference in the level of water surface of about 12 feet. With 300,000 cubic feet a minute in the 'tail-race,' this gives a water power which may be developed by proper works in the vicinity of 6,810 horse-power. If the flow in the 'tail-race' be 600,000 cubic feet a minute, there will be double this amount, or 13,620 gross horse-power, or about 10,000 net horse-power. In the event of the ship canal idea being realized, there is still greater chance for increased power in the 'tail-race.'"

President Eckhard, of the Canal Company, says:

"The simplest plan, which recommends itself, seems to be to adopt the Buffalo idea and wire the power generated up to the city. It is estimated that it would be sufficient to do the city's lighting, with power or light to sell. Probably the problem of transmitting power by wire is not altogether solved, but the reports from Niagara are encouraging enough, it seems, to warrant adopting that plan here, even if a few years evolved no better one.

"If the lighting power did not meet with favor, this power could be utilized to run the street cars, as it is said Minneapolis is thinking of doing. Or it would be a profitable income to the city leased out."

OUR CANADIAN LETTER.

PARIS, ONT.—The town has under consideration the purchase of an electric light plant.

EMBRO, ONT.—An attempt is being made to secure the installation of an electric light plant.

ST. JOHN, N. B.—Steps are being taken to organize another electric lighting company.

ARMPRIOR, ONT.—It is stated that an Ottawa firm propose to install another electric light plant in this town.

CUMMING'S BRIDGE, ONT.—There is talk of building an electric railway from Hurdman's Bridge to Morrisburg through Metcalfe.

SHAWVILLE, QUE.—An electric light plant will likely be installed here. The town is offering a company 20 years' exemption from taxation.

BRIDGEBOURGH, ONT.—A by-law will be submitted to the ratepayers at the January elections, to grant an electric light franchise to Mr. D. A. Coste.

TORONTO, ONT.—The Metropolitan Street Railway will probably be extended to Lake Simcoe, in which case an additional power-house will be erected at Newmarket or Aurora.

DESERONTO, ONT.—Another lot of cars will soon be shipped from the Rathbun company's works here to Montreal, where they will be put on the Montreal Park & Island Railway line.

NIAGARA FALLS, ONT.—Mr. Black, manager of the street railway, recently returned from New York, where he interviewed the shareholders of the road regarding its conversion into an electric road.

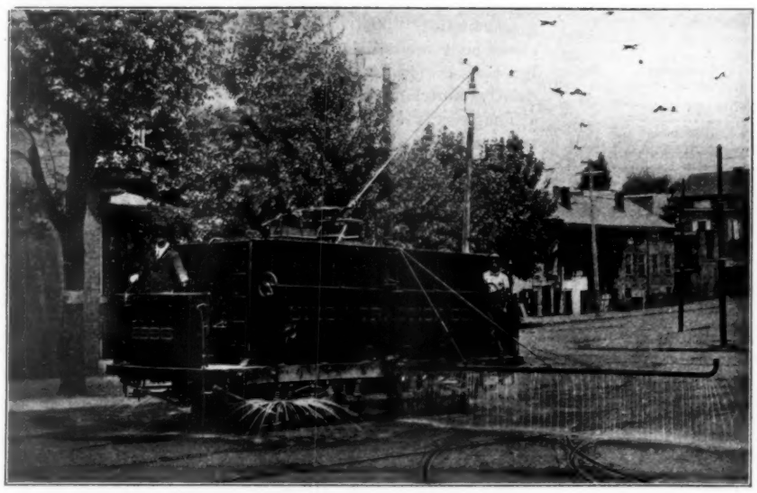
GUELPH, ONT.—Sealed bids will be received by the City Clerk up to December 18, for the lighting of the city with 90 or more arc lights. The contract will be for a term of 10 years, from July 1, 1897.

SACHINE, QUE. — The Montreal Park & Island Railway have completed their new line from Notre Dame street to College street, Sachine, a distance of about five miles, the double tracks being laid all the way.

SHERBROOKE, QUE. — The Sherbrooke Light and Water Company are enlarging their plant in the vicinity of the electric light station, and the facilities for supplying motive power to their dynamo are on a fair way to perfection.

KINGSTON, ONT.—The City Council has granted the right to the Electric Street Railway Company to extend the road to the outer Grand Trunk Railway station. The company agrees to pay two-thirds of the cost of keeping the streets free of snow.

BRANTFORD, ONT.—Sometime ago a charter was obtained for the construction of an electric railway from Brantford to Galt and Port Dover, but the scheme has never proceeded. It is now proposed, however, to undertake the work. The distance is about 15 miles. Among those interested are Mayor Elliot and Dr. Secord, of Brantford, and Henry Stroud, of Paris.



A TROLLEY STREET SPRINKLER.

NORWICH, ONT.—Mr. Graham has made a proposition to the Town Council to install an electric light plant. Should he be given the privilege, a suitable building will be erected at once. Tender for electric street lighting by incandescent lamps for a period of three years are invited until Friday, 27th inst. For particulars address J. G. Hogarthe, receiver.

SHERBROOKE, QUE.—Mr. John W. Burke, of New York, chief engineer of the Sherbrooke Street Railway Company, is in town. The organization of the company is now complete, and preparation is now being made for the construction and operation of the line. Track laying will not be possible until the Spring, but arrangements for terminals, motive power and general equipment will be proceeded with at once.

QUEBEC, QUE.—The Montmerency Electric Power Company's contract with the corporation for illuminating the city streets being about to expire, the corporation are calling for new tenders for the service. Tenders for lighting the city with 320 arc lights equal to 2,000 candle lights are invited until Wednesday, December 20, and are to be addressed to Mr. Ballairge, assistant city inspector. A deposit is required with each tender.

COWANSVILLE, QUE. — A public meeting will be held here Monday evening to discuss the question of the waterworks. It is expected that speeches for and against the by-law, to be soon voted upon, will be made. The Stadacona Water, Light and Power Company, of Montreal, have served a notarial protest on the Mayor, in which they claim to have the sole right to put a waterworks system at Cowansville, and that the action of the council in undertaking the work themselves expose them to great loss and damage.

MONTREAL, QUE.—The Royal Electric Company, of Montreal, has recently closed several extensive contracts for large electrical machinery which will keep their factory occupied night and day for more than a year, and necessitates a large increase in the number of their employés. They are advertising for a number of mechanics at good wages. They have added to their machinery equipment recently some of the largest tools of their kind in Canada, such as planers, boring-mills and drills, and need men experienced on such tools. This is a hopeful evidence of improvement in Canada manufacture and industry, the greatest part of their work being required for water-power developments and railroad purposes. J. A. C.

Montreal, December 5.

KIND WORDS.

ALWAYS ANXIOUS TO READ THE "REVIEW."

TO THE EDITOR OF ELECTRICAL REVIEW:

I am always anxious to receive the ELECTRICAL REVIEW.

D. L. HAMMOND.

November 30.

At the meeting of the new board of directors of the West End Street Railway, Boston, Mass., the following officers were elected for the coming year: Samuel Little, president; Prentiss Cummings, vice-president, and William Hooper, W. S. Swan, J. B. Russell and Alfred Winsor executive committee, with the president ex-officio.

A Trolley Street Sprinkling Car.

The sprinkling car illustrated herewith is built by the Kensington Engine Works, Limited, Philadelphia, and combines in its design and construction a number of new and attractive features. It has a tank 16 feet long, with a capacity of 3,000 gallons, enough, it has been demonstrated, to effectually sprinkle about three miles of road. The tank is of plate steel, and has six baffle plates extending from side to side, making seven compartments; these communicate with each other by triangular openings in the corners of the plates, preventing swash of the water in case of violent stopping of the car.

Manholes and openings for filling the tank conveniently and quickly are to be found at the top, and there are two hose connections arranged at the ends, on opposite sides, for filling from plugs when that is desired. Ladders from front and rear platform give easy access to the top of the tank, and float tell-tales at each end indicate the height of water carried at all times. To sprinkle over the track, and within a short distance upon each side, there are perforated pipes at both ends of the car. These curve outward and return to the side of truck.

To sprinkle the street a considerable distance on both sides of the track, the car carries two swinging arms with perforated pipes, carried on cranes that swing in a half circle, with a radius of about 18 feet, making a total width of road sprinkled of over 45 feet. These arms are worked from either platform by hand wheels actuating a worm engaging wheel on post of crane. In case of necessity, these arms can be swung against the car in 10 seconds, and are entirely out of the way. The water valves are of quick-opening design and are placed beneath the car. The Union Traction Company, of Philadelphia, has equipped its lines with these cars, using 11 for the work.

New York Electrical Society.

The last meeting of the society was held at Columbia College, on Thursday, December 10, at 8 P. M. The evening was devoted to a demonstration of "How To Test the Commercial Efficiency of Dynamos and Motors," an entirely novel form of experimental lecture. A three-horse-power dynamo and a three-horse-power motor were set up and tested in full view of the audience by a special corps of experts.

Prof. F. B. Crocker described what was being done, and made the actual tests, ex-President C. O. Mailloux took the readings and President C. E. Emery recorded them on the blackboard. The audience were informed of the reasons why each step was taken; were able to see how the method of testing is conducted from stage to stage; could see the results placed on the diagram as soon as reached, and thus enjoyed a practical lesson in one of the most important branches of electrical engineering.

Electrical Review

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Special Notice to Advertisers.

CHANGES for advertisements must be in this office by Friday noon for the following week's issue.

NEW ADVERTISEMENTS should be in the office not later than Saturday noon to insure publication the following week.

NEW YORK, DEC. 16, 1896.

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THE ELECTRICAL REVIEW FOR 1897.

With the opening of the new year, the ELECTRICAL REVIEW will begin its sixteenth year of publication.

Established at the beginning of the electrical era, it has ever been a faithful chronicler of events as they occurred, and has kept abreast of the rapidly developing industry in all parts of the world.

History does not record any industrial growth as rapid or so fraught with material benefits to mankind as has been experienced in the great field of electricity during the last 15 years.

As the oldest electrical weekly in the United States, the ELECTRICAL REVIEW considers it a great privilege and honor to have been during all this time an impartial and zealous exponent of everything that was best and most promising in the science. The fatuous teachings of false prophets, the many attempts of charlatans to impose upon the lay public under the magic name of electricity, have never found a place in our columns. When an effective exposure of men or schemes has been necessary, the ELECTRICAL REVIEW has made its criticisms fearlessly and thoroughly.

Respecting vested interests, aiding by the weight of its influence the practical and scientific progress of the art, this journal has always been an electrical newspaper, presenting promptly and exhaustively the news of its special and ever-widening field, no matter in what part of the world important developments arose.

To note here the many special and successful efforts made by the ELECTRICAL REVIEW to keep its readers abreast of the times, lack of space forbids. That these earnest and constant efforts have been appreciated and are still bearing fruit is evidenced by the growing demand for bound volumes of this journal from the first number and its constantly increasing list of present-day readers.

The year just closing, although one of great financial depression, illustrates what we have achieved, with a fair degree of success, during previous years in giving the electrical news to our subscribers.

In February last Professor Roentgen made the announcement of his most marvelous discovery of the X ray. Probably no single electrical invention has possessed the practical benefits to surgery or has been of such general scientific interest as the X ray. From the time of Professor Roentgen's announcement the ELECTRICAL REVIEW has kept its readers in touch with the thought and practice of the best minds devoted to this subject.

We printed the first official interview with Professor Roentgen and the only interview with Professor Salvioni, of the University of Perugia, Italy, who made some very interesting and remarkable discoveries on the Roentgen ray. This journal had the honor of being selected exclusively by Nikola Tesla for giving to the world the remarkable series of articles written by him, describing his wonderful progress in the study of X-ray phenomena, the development of X-ray apparatus and in vacuum-tube lighting. Mr. Tesla's valuable contributions will continue to appear in our columns.

The important work of Thomas A. Edison in the same fruitful field and his always interesting experiments in other directions have appeared in the ELECTRICAL REVIEW in the form of communications and authorized interviews.

This journal was also the first to give an illustrated description of the new Westinghouse-Baldwin electric locomotive, and promptly noted the ingenious efforts of Dr. William W. Jacques to produce electric current direct from fuel by means of his carbon electric generator.

The patents on Mr. Tesla's electrical oscillator were issued to him toward the end of the year. The special features and promising possibilities of this brilliant discovery were instantly presented to our readers.

The great work which has been carried on at Niagara Falls for years, involving the highest engineering talent and the expenditure of large capital, reached a climax when the electric transmission line to Buffalo was opened in November. The ELECTRICAL REVIEW was the only weekly newspaper which had a member of its editorial staff on the spot to chronicle an event teeming with practical benefits to thousands of users of power.

With the past as a criterion, we believe that our many new readers, as well as our thousands of old friends, will accept with confidence and pleasure the statement that during 1897 we shall relax no effort to make the ELECTRICAL REVIEW the most interesting, reliable and valuable journal devoted to the various branches of the electrical industry.

As in the past, we shall continue to print promptly not only the great scientific discoveries and practical inventions in the art, but also the every-day news in detail of the commercial and business life of the industry. Special articles by able, practical men, relating to the latest developments in electric traction, lighting, telephony, heating, telegraphy and in other allied branches, have been secured for exclusive publication in the ELECTRICAL REVIEW during the coming year. We believe that these special contributions will be particularly instructive and practical, and will well repay the management of this journal for the effort and expense required to secure them for the benefit of all its readers.

A New Telephone and Electrical Company in St. Louis.

A new corporation with an abundance of means has been formed in St. Louis, which is intended to control the telephone and largely, also, the electric lighting interests of that city. The articles of incorporation of the St. Louis Electric and Construction Company have been filed, with a full-paid capital of $600,000, and the same incorporators have also closed a deal which puts them in possession of the Citizens' Electric Light and Power Company and the Telephone and Telegraph Service Company. Both of these companies have had but a nominal business for years, but own certain charter rights.

The following gentlemen, reported to be interested, are wealthy and leading men of the city: Adolphus Busch, brewer; Ellis Wainright, brewer; August Gehner, banker; Samuel N. Kennard; Julius S. Walsh, banker; Charles H. Turner, electric railways; Wm. F. Nolker, brewer; Wm. T. Haartick; L. P. Pierce; Breckinridge Jones; Wm. D. Orthwein, brewer; H. S. Priest, lawyer, and Hopkins J. Hanford, organizer of the Detroit Telephone Company.

A dispatch from St. Louis states that the organization has been made with the particular intention of placing the telephone business of that city on a more popular basis. General offices are to be opened, and applications have already been made for conduit space with the Board of Public Improvement, and bonds aggregating $140,000 have been filed with the Mayor and council. It is evident that the company is proceeding in good faith, and it is likely there will be some important electrical developments in St. Louis very soon.

Western Electric and the St. Louis Deal.

A Chicago dispatch says that the Western Electric Company has not bought an interest in the St. Louis Electric Light and Power Company, as was reported last week. The only basis for this story lies in the fact that some of the individual stockholders in the Western Electric Company have become large stockholders in the St. Louis Electric Light and Power Company, and that company proposes making a number of extensions and improvements. The Western Electric Company will not depart from its business of manufacturing electrical equipment and supplies. There is to be no increase in capital stock beyond $3,000,000.

A Trolley War on Staten Island.

At New Brighton, Staten Island, on Sunday of this week, a trolley war occurred between the Staten Island Electric Railroad Company and the Staten Island Midland Railroad Company. The dispute was over the right to build a trolley railroad on Castleton avenue, in New Brighton. There is a dispute on over the franchise for the road. It required the whole police force of the village to arrest and rearrest the workmen who were trying to lay tracks.

Ohio Telephone Exchange Association.

The annual meeting of the Ohio Telephone Exchange Association was held at Columbus, Ohio, on December 7, there being a good attendance of representatives from all parts of the State. The State of Indiana was represented by Mr. G. W. Beers, of Ft. Wayne. The association is composed of the independent telephone exchanges, practically all of the larger independent telephone exchanges of the State being included in the membership. The election of officers resulted in the following, all except the second vice-president being re-elected: President, Judge James M. Thomas, Chillicothe; first vice-president, D. J. Cable, Lima; second vice-president, Guy Huffman, St. Marys; treasurer, Edward Kibler, Newark; secretary, H. D. Critchfield, Mt. Vernon; assistant secretary, William Hoyle, Cambridge.

The chief matter of discussion at this meeting was the proposed joining together of all of the independent exchanges by means of metallic circuits. At present each exchange is said to be connected with from 50 to 150 towns in the several localities.

The Indiana independent exchanges are in hearty accord with the movement, Mr. Beers representing 120 points which are situated in northeastern and and northwestern Indiana.

A Big Trolley Road in Connecticut.

A large suburban electric railway scheme was announced at New Haven, Ct., on December 9. The new line is surveyed to start in Westville, to run through Woodbridge and Seymour, and terminate in Naugatuck. The enterprise is backed by the following people: Morris F. Tyler, Dr. Thomas H. Russell, Dwight N. Clark, Robert Payne, Stiles Williams, Charles F. Walker, Rollin C. Newton and Nathan P. Merwin. All the capitalists are residents of Woodbridge, the first-named two being New Haveners, who reside in the former place during the Summer season. Official notice has been given by the projectors that they would, at the coming session of the legislature, formally apply for a charter to put through the road. The charter will ask for the incorporation of a company to construct a road with electricity as a motive power. The proposed line will be 15 miles in length, and it is thought it will cost about $200,000. No company has yet been formed.

Edison Electric Illuminating Company of New York.

The earnings for November of the Edison Electric Illuminating Company of New York, including the high-tension systems, were as follows:

	1896	1895	Increase
Gross.....	$ 225,529.40	$ 192,037.72	$ 33,491.68
Net.....	123,888.32	93,952.36	29,930.96
Gross, 11 mos.	2,001,162.05	1,786,738.23	214,423.82
Net, 11 mos...	961,091.53	825,356.87	135,734.66

The Berliner Case.

A special dispatch to the ELECTRICAL REVIEW from Washington, D. C., on Monday, December 14, states that there are no new developments in the Berliner case.

The Adoption of Electricity by the Metropolitan Street Railway Company.

The decisive action of the directors of the Metropolitan Street Railway Company last week in voting to adopt electric traction on its street railway lines on Fourth avenue, Sixth avenue and Eighth avenue, instead of horse-power, at present in practice there, is a progressive step that this great corporation takes at an opportune time. The system to be adopted will be the underground trolley, probably on similar lines to the system now operated by the company on Lenox avenue in New York city.

The board of directors hold a very important meeting on Wednesday of this week, at which time plans in detail will be considered and probably orders for the apparatus given out.

The ELECTRICAL REVIEW believes that President H. H. Vreeland and Vice-President and General Manager H. M. Littell are the gentlemen largely responsible for this improvement on the part of the Metropolitan company. It is to be hoped that through their efforts the peculiar distinction that New York is enjoying in running antiquated horse cars on its streets will soon be removed.

PERSONAL.

Charles Stewart Smith has been appointed a member of the New York Rapid Transit Commission to succeed Wm. Steinway, deceased.

Mr. W. W. Low, president of the Electric Appliance Company, Chicago, was among the out-of-town visitors to New York city last week.

Messrs. F. A. Gilbert and J. M. Orford, of the Boston Electric Light Company, Boston, Mass., visited New York city last week and favored the ELECTRICAL REVIEW office with a call.

Mr. S. C. Schenck, for a number of years the New York expert for the C. & C. Electric Company, has resigned his position and has formed a connection as an associate with Mr. Thomas J. Fay, the former manager of the C. & C. Electric Company. They are New York agents and exporters to Mexico, Central America, South America and the West Indies for dynamos and motors.

Death of H. A. Craigin.

Mr. H. A. Craigin, of the Westinghouse Electric and Manufacturing Company, died of pneumonia in the city of Mexico on November 27. He was a graduate of the Massachusetts Institute of Technology, and had been connected with the Westinghouse company, as a salesman, for several years.

A New Telephone Catalogue.

The American Electric Telephone Company, of Kokomo, Ind., has issued a new catalogue, No. 5, illustrating and describing its very complete line of telephone apparatus and supplies. It includes nearly everything telephonic.

Underwriters' National Electric Association.

The electrical committee of the Underwriters' National Electric Association held meetings in the board room of the National Board of Fire Underwriters, 32 Nassau street, New York city, on December 8, 9 and 10 to consider changes in the national code of rules for electrical installation and construction. Several important points were thoroughly discussed, and the committee will formulate a report of the results of these meetings for presentation to the Underwriters' National Electric Association. The changes made in the national code will be announced later. Delegates were present from Philadelphia, Boston, Denver, New Hampshire, New York and other places.

Electric Lights for a Long Tunnel.

A press dispatch dated at Spokane, Wash., says that from the Florence district, in Idaho, comes the news of one of the largest mining undertakings ever conceived in the northwest. This undertaking is the construction of a tunnel four miles long to tap the entire Florence camp. The tunnel is to be made large enough to admit a double track, and will be lighted by electricity. A company will be incorporated, with a capital of $2,500,000, to carry out the enterprise, and it is hoped to start work on the tunnel in April or May, next year.

The First 1897 Calendar.

The first calendar for 1897 received by the ELECTRICAL REVIEW is from the Connecticut Telephone and Electric Company, of Meriden, Ct. The upper part is a handsome picture showing a prim Quaker maiden on her way to seventh day meeting. It is not just clear to the office cat's mind why this beautiful study should be labeled "The Fairy of the Swamp." It is one of the handsomest calendars ever received by the ELECTRICAL REVIEW.

T. J. Murphy & Company Make an Assignment.

Thomas J. Murphy and Joseph F. McGuire (T. J. Murphy & Company), manufacturers of electrical supplies at 511 West Thirteenth street, New York city, made an assignment on December 11 to Frederick Hulse. The firm made a specialty of slate for switchboards and other electrical purposes.

Good Advice, Now Pertinent.

[*From an Unknown Source.*]

"Advertising in the right place at the right time will help any business. It will open new avenues of trade and will make travel on the old avenues smoother and easier."

Mr. Angus S. Hibbard, general manager of the Chicago Telephone Company, is a gentleman of unusually acute observation and unquestioned technical ability. For these reasons his remarks on the telephone service in European cities, which appear in the form of an interview elsewhere in this issue, make profitable and interesting reading.

THROUGH TELEPHONE EYES.

GENERAL MANAGER ANGUS S. HIBBARD, OF THE CHICAGO TELEPHONE COMPANY, GIVES HIS VIEWS ON EUROPEAN METHODS.

Mr. Angus S. Hibbard, general manager of the Chicago Telephone Company, recently returned from a comprehensive tour of Europe, where he devoted several months to traveling by wheel with a party of Americans. As he has built and organized many of the largest telephone exchanges on this continent, it is doubtful, says the Chicago Evening *Post*, if the observations of any other American would be more interesting and valuable than his regarding the telephone systems of Europe, their use and points of contrast with the equipment and service in the United States. In an interview Mr. Hibbard said:

In making even a brief investigation of the telephone exchanges and service in European cities, I found it necessary first to arrive at an appreciation of the differences in the methods of conducting business and of living in these old world cities as compared with similar places in America. We have heard many times that the foreign business methods were much slower than our own, but I never so fully appreciated this as now. I found, for example, that while in some places a few stores or offices are open until 9 o'clock in the evening, the banks are closed at 12 o'clock noon, and remain closed until 4 P. M. Transactions between offices or mercantile houses are carried on almost entirely by letter, and the telegraph service is utilized very largely for short written communications.

No one is in a hurry; if anything is to be done, there seems to be plenty of time in which to accomplish it, and there is no worry as to the amount of time it may consume. In doing business with a bank, a customer, on entering, removes his hat, hangs it up on a suitable peg, takes a seat on the well upholstered bench and waits until the bank people have time to attend to his wants. This leisurely method of doing business was observable even in stores. There seemed to be no crowding and pushing, and everything was conducted on an easy-going plan.

The telephone, in taking its place as a useful means of communication, has fitted itself into these slow-going ways which have been so long established. There are a great many telephones, and wherever they are used the patrons are apparently satisfied with the results. Their use, however, is very infrequent. By banks and many very large mercantile houses they are used not at all. I found in many business places that the use of telephones is confined to the briefest kind of messages, usually of an unimportant character. They are rarely used for complete verbal transactions or for long conversations. Instead of carrying on an actual business conversation by means of the telephone, it seems to be the habit to make an appointment with the person in question by telephone, and then go to his office to do the talking.

Appreciating these differences, it was apparent that telephone service in Europe is a very different thing from that given by the American exchanges. The actual service, as compared with our own, was slow; but the slowness did not count for much, and was not very noticeable, because any one person rarely had occasion to use the instrument more than once or twice a day, and a delay of a minute or more in the completion of a call, therefore, occasioned no complaint. The volume of transmission was not as loud, nor was the articulation as clear and distinct, but the users seemed to be accustomed to this. As the conversations were, as a rule, in no way involved in figures, and were not, perhaps, concerned with very important matters, the inferior quality of the transmission was little noticed. The telephone apparatus in France and Germany is quite different from that used in America. Transmitters with thin wooden diaphragms are almost universally used there. Some of these are in the form of small desks and the speaker talks against the inclined top.

The hand telephones in Germany are of abnormal dimensions, and weigh, I should judge, nearly eight pounds. With the telephone at the ear, almost the entire side of the head is covered, and a person is not tempted to carry on a very long conversation and sustain the weight of the hand-receiving apparatus. In the telephone exchanges the switchboards used are either manufactured by American firms or copied from their designs. I did not find any operating appliances which were original in Europe, but all were of American design, and nearly all of them out of date. The small number of calls made upon the telephones was especially noticeable in the exchange offices. Nowhere did the operators appear to be busy, and the limited number of plugs and cords in use upon the switchboard indicated how few the calls were.

The offices were, in all cases, well furnished and in charge of apparently very competent people. Nearly all the telephone wires are overhead, and attached to iron fixtures erected upon housetops. In Germany a portion of the wires are led into the larger exchanges in underground cables, but in nearly every German city more than three-fourths of the wire mileage is attached to housetop fixtures. The same method of construction is used in Paris, but in that city more of the wires are placed underground. The large sewers of Paris, which I had an opportunity of examining, are used as conduits for the underground cables, but do not seem to me to be so well adapted to this purpose as is the underground duct construction in use in this country.

The exchanges in London and Paris are operated almost entirely upon the metallic-circuit system, and the results in transmission are much better than in the German cities, where nearly all of them are operated upon the ground-wire plan, with much consequent impedance and induction. This is especially noticed, as electric railways are being introduced into Germany, and it seems certain that, with further extensions of these railways, the grounded service in Berlin, Hamburg and other large cities will be very much interfered with.

The class of construction of the electric railways, as it related to their poles, trolley wires, feeder wires, etc., seemed to me to be much superior to most work of this kind in America. The poles are neat and ornamental, but, as far as possible, they are entirely dispensed with, and the wires supporting the trolley are attached to buildings. In many cases, also, the poles are placed up against buildings rather than at the edge of the curbstone. Whenever aerial wires, either telephone or telegraph, cross the trolley wires, wooden guard strips are attached to the trolley wire itself. These are almost certain to prevent any actual contact between the wires in case of a break.

In Berlin an electric railroad, recently built to provide transportation to the exhibition, is operated by overhead trolley wires until a certain boundary line near the edge of what might be called the downtown district is reached. There the overhead wire stops, and the car is operated by an underground trolley. A shoe extends down from the car through the slot in the rail and makes the contact with the trolley wire underneath. This is the same system which has been in successful use for more than a year in Budapest.

I do not intend in any of my observations to cast any reflection upon the telephone service in the cities I have visited. The service seems to be as good as is demanded by the users of telephones. It is, however, certain that service of a like character would not meet the demands of telephone patrons in America. Here the telephone has fitted into our busy and rapid methods of conducting affairs. If business were slow enough, no telephones, telegraphs, mails or rapid transit would be demanded. As rapidity in business increases, the more valuable become the ways and means of annihilating time and space. It is a pleasure, therefore, to realize that in our own country the telephone keeps pace with the demands of our busiest people, and in so doing has advanced to a place of usefulness not yet reached by it in any European country.

Of Importance to Manufacturers.

TO THE EDITOR OF ELECTRICAL REVIEW:

The question of reliable water supply for fire purposes is one of considerable importance and often anxiety. The water at hand is often needed for manufacturing purposes and for use in steam generation, and none can be spared for sprinkler use. Again, mills are sometimes built upon the banks of a supposed good water supply and find that the source decreases yearly, until, after a while, the mill has to economize greatly. This is serious. Some mills carry water by tunneling a long distance.

Then mills grow in size, so that a water supply which was adequate for the time is insufficient to keep up with the growth of the mill; then money must be spent in enlarging water supply facilities. The mill manager has long since discovered that the water supply is a question of no small moment.

For fire equipment purposes a supply from a pond or river is the most preferable, as it is less likely to fail. If the water is carried in pipes, the size of the pipe should be such as to convey an ample supply with the least friction, for friction in a water pipe causes loss of flow. A small pipe has frequently saved a few dollars in first cost, and has been a matter of constant expense as well as of annoyance during its whole term of service. It is necessary to have the line of suction pipe put in in the most thorough manner. Use the best of pipe as to quality, and whether cast or wrought-iron, have the joints between lengths formed in the most approved manner and the work done under strict specifications and inspection. Ill-fitting joints are almost sure to cause trouble.

It is very easy to test the fitting of the flanges by wiping clean, freeing from grease, dirt, etc., then rubbing on a little red lead paint or plumbago and oil; a very thin coating only should be applied, which is then placed in the bearing and revolved once or twice. Upon being removed, the red lead which has become attached to portions will reveal just where the flanges touch.

If the pipes can be adjusted so that the water will flow by gravity from the source of supply to the pumping station, such a system should be adopted. If it is necessary to have the level of the water below the surface of the ground, then it is best to place the pump low enough to come within eight or nine feet of the water, thereby preventing an excessive lift by the pumps. If a limited supply of water is available, as would necessarily be the case where no river or lake supply exists, it is highly important to build a reservoir of ample capacity.

An ordinary sized mill should have a reservoir of such dimensions as to store such a supply that at least 1,000 gallons could be pumped per minute for several hours.

Where the automatic sprinkler system is used, a tank of about 7,000 or 8,000 gallons capacity is ample. Under ordinary circumstances, from 1,500 to 3,000 gallons serves to extinguish a local fire by the sprinklers.

In putting in an automatic sprinkler system, it is policy to secure the best arrangement that it is possible to have, even if it does cost more money to start with. The steam fire pumps should always be duplex, and about 1,000 gallons per minute capacity. The main line from the pump running through the building must be the same size as the discharge opening at the pump, and not reduced until after the first branches or hydrants are passed.

The hose should be located at close intervals throughout the building. Hydrants should be placed outside. A hose carriage, as an auxiliary to the hydrant, is valuable.

Next in importance to having a good equipment is having the men drilled in its use. A good system is to appoint a man for each hydrant or department hose connection, and the fire signal from the steam whistle will call him to his place.

Each hydrant man will require an assistant to aid in lining up the hose. Three sharp blasts of the whistle is the signal for appointed men to immediately leave their work and take their respective positions.

The roof outside of mill, storehouse and other places should be covered as well as the floors. The men can be kept in practice by weekly alarms given without notice.

One of the men should be appointed chief, and he will see that the rules are regarded.

This system was adopted in a mill in which I was once employed and worked satisfactorily.

M. W. DANIELSEN.

CHATHAM, ONT.—The council will purchase an electric light plant.

ELECTRIC LIGHT FLASHES.

The Western Electric Company of Chicago, Ill., has not absorbed the St. Louis Electric Light and Power Company, as reported.

The Keewatin Power Company, is making contracts to supply electric power in Winnipeg, Manitoba, transmitted a distance of 130 miles. Wnew!

At the annual meeting of the Wilkes Barre, Pa., Electric Light Company the following directors were elected: A. H. McClintock, Benjamin Reynolds, H. H. Harvey, William Stoddart, C. W. Lee, Joseph D. Coons, S. J. Strauss, C. E. Stegmaier, S. L. Brown, Isaac Long and H. B. Hillman.

A suit for $50,000 against the General Electric Company is brought by Louis M. Packer, of Lynn, for damages as a result of injuries received in the company's works. Both Mr. Packer's hands and arms to the elbows were cut off by a machine which he claims was unsafe and defective. The accident happened on May 11, 1895.

The stockholders of the People's Power Company, of Davenport, Ia., at their annual meeting, elected the following directors and officers for the ensuing year: Messrs. Phil Mitchell, S. S. Davis, F. B. Davis, C. H. Deere, C. G. Nason and W. L. Velie, directors; officers: President, C. H. Deere; vice-president, Phil Mitchell; secretary, S. S. Davis; treasurer, C. O. Nason.

Alderman Gallagher expects to save the city of Chicago, Ill., $25,000 or $30,000 a year by compelling the steam railroad companies to pay for lighting the new subways. There is an ordinance requiring the companies to light crossings, and the Alderman believes the city has the right also to compel the lighting of subways. He has instituted an inquiry as to how many crossings the companies now light and the number lighted by the city.

The New York, New Haven & Hartford Railroad Company is contemplating the use of electricity for every purpose possible for which it is available, including the hauling of trains. It is the intention of the company to have the tracks lighted by electricity, so as to preclude any possibility of accident from the rare causes from which the block system can not insure protection.

H. R. Wagar, president of the Ionia, Mich., Electric Light Company, has petitioned the Common Council for a five-year extension, or more, of the electric light contract now pending between the company and the city. Mr. Wagar contemplates the building of a dam across Grand River east of Lyons, and obtaining water power sufficient to furnish the city with 500 horse-power at a low rate. The expense will be about $30,000.

The Thomson-Houston Electric Light Company, of Omaha, Neb., has been reorganized. The company has decided to expend at least $100,000 in extensive improvements. An entirely new plant is to be constructed on the property owned by them at the foot of Jones street. Thomas L. Kimball, formerly a director, has been elected president. W. F. White, who has been the general manager of the company for about a year past, will continue in his present position. Fred A. Nash, general agent of the Chicago, Milwaukee & St. Paul Railroad in Omaha, will be the new vice-president.

Electric Power Along the Erie Canal.

Mr. Frank W. Hawley, vice-president of the Cataract General Electric Company, in an interview concerning the distribution of electric power from Niagara Falls along the Erie Canal, said:

It is only since the completion of the great work at Niagara and the successful transmission of power to Buffalo that the demand has been made for these riparian rights. Already nearly $10,000,000 has been invested there, but there are to-day projects developing which will involve an additional expenditure of $8,000,000. This money is easily secured.

I think the only practicable plan is to sell the power measured on the turbine shaft to the highest bidder. But great care should be taken in the acceptance of the highest bid, for the rights the contractor would enjoy would be perpetual.

We were somewhat alarmed at one time lest the diversion of water would interfere with the navigation of the Erie Canal, which secures its water supply for 200 miles from the Niagara River. This was the only source of anxiety, as the abundant flow of water over the falls assures us an unfailing supply for the wheel pits of the Niagara Power Company. Investigation satisfied the Public Works Department of New York that not to exceed a foot of water would be taken from the lake level, and, relying upon this information, the State, at a recent election, authorized the expenditure of $9,000,000 in the enlargement and improvement of the canal.

The immense utility of this canal in conveying the products of the northwest to tide water suggests another reason why the power which the canal will afford should be used. Should it be made navigable it would be extremely important that all power needed in propelling canal boats and operating locks should be obtained in abundance and at a minimum price.

The B. & O. Railroad is preparing to extend its compressed air plant at the Mt. Clare shops. A new locomotive repair shop is being built, and compressed air will be very extensively used. Two 50 ton cranes have been purchased for this shop, and the power will be electricity, furnished by the power station that also furnishes the electricity for the motors in the Baltimore city tunnel.

A New Electric Curling-Iron Heater.

Since the universal introduction of electric lights in hotels, apartment houses and dwellings in our cities, to the entire exclusion of other illuminant, there has developed a demand for some method for heating irons for curling the hair. Alcohol lamps of innumerable forms have come rapidly into use, and have been a source of constant anxiety, as well as no inconsiderable loss, due to fires resulting from accidents and careless use of these highly dangerous devices. Recognizing the demand for a safe and simple appliance, the American Electric Heating Corporation are introducing an improved electric curling-iron heater, so constructed that it can not be in circuit unless the tongs are inserted in the heater, when removed the circuit being automatically opened. The heater is made in nickel finish or polished brass mounted on polished marbleized base, complete with cord and plug for attaching to lamp socket, the current consumption being but 50 watts. For hotel use they are mounted on marble or other bases arranged to screw to the wall. Among others, they have recently been installed as fixtures in the dressing rooms of the new Waldorf and also the Majestic, in New York; in 75 dressing rooms in the new addition to the Parker House, in Boston; besides which, several additional large contracts have been secured. The illustration shows the general appearance of the device, which is a very attractive ornament, and provides an electrical Christmas present for the electrician's best girl.

ELECTRIC CURLING-IRON HEATER.

Postal Telegraph and Commercial Cable Combine.

The directors of the Postal Telegraph-Cable Company and the directors of the Commercial Cable Company met on December 1 at the Postal Telegraph Building and formulated a scheme for the closer alliance of the two companies. The relations of the companies will not be changed, except that they are to be bound closer in organization by the absorption of the stock of the Postal Telegraph-Cable Company by the Commercial Cable Company. The capital stock of the Postal company is $15,000,000, with no bonds, and the capital of the Commercial company is $10,000,000, with no bonds. Under the new scheme the Commercial company will give in exchange for the Postal stock a debenture or collateral trust bond at par, guaranteeing an annual dividend of four per cent. A meeting of the stockholders to ratify the action of the directors has been called for December 22.

ELECTRIC TRACTION UNDER STEAM RAILWAY CONDITIONS.

A TOPICAL DISCUSSION BEFORE THE AMERICAN INSTITUTE OF ELECTRICAL ENGINEERS, NEW YORK, OCTOBER 21, 1896.

(Continued from page 290.)

Mr. F. W. Darlington: In connection with transmission on electric roads, it seems to me that two classes of problems have to be solved—ordinary trolley systems operating single light cars, large trolley systems, such as the New York Elevated, operating trains with heavier cars, and the regular steam railroads. The difference between the elevated roads and the steam railroads is simply that in the case of the elevated road, it is a large trolley road in that it has frequent stops, though not so frequent as on the surface; but still the problem, in a measure, is the same. It seems to me that the solution under experiment on the Third Avenue Elevated road with storage batteries will not produce any results directly applicable to the other problems. On the elevated road the trains are running under momentum part of the time, and part of the time they are accelerating their speed as rapidly as possible. For the conditions existing on the elevated roads it may be possible to charge the storage battery sufficiently, during the time of running, with momentum to supply the train with all that it will demand at other times. When you come to steam railroad conditions, however, you have the condition for express trains; that power is put on and stays on during an entire run over a section. Take, for example, the New York and Chicago Limited over the Pennsylvania Railroad; it runs from Philadelphia to Harrisburg without a stop. There they change engines and make another long run, and during the time it is running, if it is supplied from a central power station electrically, the power taken will be practically the same during the whole run. This we have demonstrated on the Burlington and Mt. Holly branch of the Pennsylvania Railroad Company in New Jersey. They have considerable grades there. We found that the indicator on the ampere meter, at starting the train, would jump to a certain point and fall gradually while the train makes a run over the entire road (in proportion to the speed at first); but after it gets speed—its maximum speed—the indicator will remain practically constant, independent of the grades. This is because the speed is varied on the grades, the train going slower up hill than down, but calling for an even supply of power. To such a problem as this it seems to me the storage battery (while at first thought I was struck with the beauty of the solution proposed for the elevated road) will be of no use, however; and one other thing, in connection with the work over there, that applies to the problem of changing over from steam to electricity is the ability to get up speed rapidly. The road there is seven and three-quarter miles long; the last three-quarters of a mile of it are so-called "yard limits," counting from the Burlington end. The distances are all laid off by mile posts. Starting out from Burlington, in six miles we have obtained a speed of 72 miles an hour and maintained it for three miles, and slowed up again so as to have the train under control by the time we reached the yard limits, six miles and a quarter. I am confident that no locomotive on that division of the Pennsylvania Railroad can do that with an ordinary light

train and on those grades. Another time we started on a two per cent grade with a train of cars, making the total train load two and one-half times what the motors were calculated for, at a point three-quarters of a mile from a mile post, which is located at the top of the grade and then practically level. We made that first mile, from mile post to mile post, at the rate of 48 miles an hour. With these results and the ability of motors to start a train quickly, it appears to me that this problem of the substitution of the electric motor for the steam locomotive is not so far off as it has been pictured to-night. Of course, the whole problem, so far as I can see, resolves itself into the method of transmission of power from the generator to the line. This point has not been solved yet. It, of course, includes the method of collecting the current. The third rail seems to be a good thing if it could be used and be safe, but we have made that 72 miles an hour with an ordinary overhead trolley wire with very little trouble. I am very much interested in the solution of the problems that are under way at the present time, and I think that line being built between Baltimore and Washington is going to give us some very practical results in the method of long-distance work. In the matter of grades, we must remember, in first attempting steam railroad work, that our conditions for high-speed work are practically the same as for steam railroads. In laying out new roads, grades and sharp curves must be eliminated if we want to obtain high speed.

Mr. H. Ward Leonard: Mr. President and gentlemen, I have made no preparation, and hence have no remarks to make which are very well defined. There is one point that has occurred to me, in connection with the remarks of Dr. Emery, that I think worthy of comment, although they embraced so many figures it is impossible to speak conclusively off hand. I noticed tha in the cost of conductors for the low-tension portion of the system, if I understood him correctly, he allowed $12,000 per mile for the copper, and that the trains were located at about seven and one-half miles apart, and, roughly, about 500 horse-power to a train. This, it strikes me, is an overcharge, as regards investment—about $85,000 for copper for a train of 500 horse-power—and, naturally, will make the cost of investment very large against electric railways. One point that I have always believed in, and that, it seems to me, is likely to be more and more pronounced in the future, is that there must be a conversion of energy before we can operate the electric locomotive at all, and the question arises as to where such conversion should take place. Of course, if we convert our energy and store it, by the use of storage batteries, in the station or along the line, or on the locomotive, we are, in one way or another, converting the energy that we are using in the locomotive. If we substitute, instead of storage batteries, in one place or the other, rotary transformers along the line, we are also converting. In the latter instance we are adding very greatly to the cost of the equipment by the fact that each one of these converters along the line must have capacity not merely for one train, but for the maximum that may get in that section at one time. What I wish to emphasize, as my belief in the matter, is that the conversion must take place, for the greatest advantage, upon the locomotive itself; that, if storage batteries are to be used, they should be placed upon the locomotive; if rotary transformers are to be used, they should be placed upon the locomotive. The transmission of power over considerable distances should be done by the alternating system, to secure the best results as regards economy and flexibility, and especially in the case of long-distance work, as regards the convenience of securing a large number of feeding points, and thereby reducing the cost of any low-tension conductors to a very much lower figure than that given by Dr. Emery.

Now the question arises as to what would be the best method of operating the motors, and I think there can be little question to-day that a continuous current for the motors is preferable to the alternating. If it be true that the alternating should be used for the transmission, and that the continuous current should be used for the propelling motors, and that rotary transformers be upon the locomotive, the cost of conductors then, as regards distribution, is limited only by considerations, such as would pertain to any long-distance transmission—the possible voltage along the line. The conversion could be as cheaply accomplished on the locomotive as alongside of the road. Each transformer, in a case where the transformer is located on the locomotive, would have to take care only of that particular locomotive and train that it was intended for, and no margin need be provided to take care of additional transformation, as would be the case in transformers which were outside of the locomotive itself.

As regards the question of possible methods of gearing, I may say that there is one electric locomotive which has run some 2,000 miles, covering distances of 500 and 600 miles straightaway, which did not meet with any difficulty of the character described by Dr. Emery as to the methods of gearing and connecting between the locomotive and the axle. This is the Heilmann locomotive, which had, in the locomotive which was tested about two years or more ago, a single reduction between the motor and the driving axle. There were no coupling rods—side rods—on this locomotive. It ran at upwards of 60 miles an hour, and no difficulty of the nature spoken of was experienced. But, on the contrary, the motion of the locomotive was conspicuous by its smoothness and entire freedom from all jar. The Heilmann locomotives which have been under construction since the original tests, and which will be in practical service very shortly, have the axle passing through the center of the motor; that is, there is no gearing, but the driving is accomplished by the armature being connected to the shaft through a kind of spider, something after the nature of the method of driving which we are familiar with by its use in the Short gearless motor a few years ago. This method of driving will be soon tested, and we will then be able to learn whether such difficulties as have been pointed out will or will not arise. A thing which I do not think enough stress has been laid on in the comparison is the fact that we have reached what appears to be practically a limit in the size and horse-power of steam locomotives; whereas, there is practically no limit, as compared to the present limit in the horse-power, possible for electric locomotives; and since the thing which is of the greatest importance to-day in railways is to secure, first, higher speeds, and, second, great hauling power, it seems to me that the electric locomotive has a very marked advantage in those lines. Take, for example, the steam locomotive which hauls the New York Central Limited, and which has been pretty carefully tested between here and Albany. The maximum horse-power was in the neighborhood of 1,000. The horse-power that was developed while accelerating the locomotive to its full speed, and while the speed was at the rate of about 30 odd miles an hour, was about 600 horse-power. The steam pressure fell very rapidly as the speed increased; that is to say, the mean effective pressure in the cylinder; and this is a trouble which is met with in steam locomotives which will be absent in the electric locomotive. There is a very marked falling off in drawbar pull due to the inability of maintaining a high mean effective pressure in the cylinder of the steam locomotive, which would require considerable modification from present types before it can be avoided, it being due to the limitation of rapidity of admission of the steam and one or two other considerations. The maximum weight on drivers that steam locomotives have is, of course, the limit to their hauling power, and that very rarely exceeds about 170,000 pounds, and with the electric locomotive there would be no difficulty in making that weight almost anything desired. In the Heilmann locomotives that are now under construction that weight will be 230,000, and that 230,000 pounds will be effective for a perfectly smooth pull. Tests that were made upon the Heilmann locomotive in comparison with the steam locomotive, by means of a dynamometer car, showed a very marked difference in the smoothness of the drawbar pull. The curve of the electric locomotive, as might be expected, was quite smooth, while that of the steam locomotive was very jagged. All this, of course, is very influential, with a very large load behind, in tending to skid the wheels. One good feature of the Heilmann locomotives which ought to commend it, if it has no others, as some people seem to think, is that it enables one to study with great accuracy the electric traction problem. The question of speeds and horse-power, drawbar pull and all such points as that can be very accurately studied by means of it. The cost of a locomotive of that type is necessarily going to be considerably higher than that of the ordinary steam locomotive. But the hauling capacity is going to be so greatly increased, and also its possible speed, that it may have a field which would not pertain to it if it had no advantages in speed and hauling power. The Heilmann locomotive is now being finished, and will be tested so soon that a great many of these points will soon be a matter of fact, and we can secure more reliable data of that nature than we have at present. One point which, I think, is rarely appreciated is this: That tests upon the steam locomotive show that the efficiency between the indicated horse-power in the cylinder and the horse-power at the drawbar, which, of course, is the efficiency of the machine—the ratio between the horse-power at the drawbar and that in the cylinder for the steam locomotive operating at about 60 miles an hour—is between 42 and 43 per cent, which, I think, will impress you as quite low. The expectation in the case of the Heilmann locomotives, based upon well known features in the Willans engine and in generators and motors, assuming 90 per cent for the engine and 95 per cent for the generators, 98 per cent for the conductors and 90 per cent for the motors, will give an efficiency at 60 miles per hour of some 47 per cent as the ratio between drawbar pull and indicated horse-power in the cylinder. I think we must all admit that the question of attempting to replace the steam locomotive of to-day is an extremely difficult task for the electrical engineer. But it does seem to me that we should draw out as many points as we can favorable to electric locomotives, and it does not seem to me that that has been done in the remarks of Dr. Emery. (Applause.)

Mr. Geo. S. Strong: Not being a member of the society, I was invited here to-night by the secretary to discuss this matter from the standpoint of a locomotive man. In doing so, I do not want to be understood as being partial to the locomotive. In fact, I am on both sides, as I am interested in the building of power plants for electricity as well as the building of locomotives. I have studied this subject from the beginning of the electrical operation, and as regards the Heilmann locomotive, I might say that I was the first one to build a motor car on the principle of the Heilmann locomotive, and I have had about $20,000 worth of experience in that line. (Laughter.) And as regards the efficiency, I had an electrician who promised me 95 per cent of the power of the engine which was put on the car. We had a gas engine which indicated and gave a brake horse-power of 40 horse-power. The generator was directly on the shaft of the gas engine. The motors were directly under the car, with the wire connections very short—not over 10 feet of wire in it. I think two mules could have pulled that car faster than that 40-horse-power engine could drive it. (Laughter.) Now, that is my experience with that kind of a motor. I do not say that that can not be beaten by a properly constructed generator and a properly constructed electric motor under the car, but it led me to believe that some other method of transmission of power would have to be originated before the gas motor would ever become an efficient motor for driving street cars.

Now, as regards the question of the amount of coal necessary to drive a locomotive, Dr. Emery gives six pounds as the average. Mr. Westinghouse has given it as high as eight pounds. I have tested a number of locomotives that ran as low as three pounds. I have a locomotive to-day built, ready to run, on which I will guarantee to give a horse-power for two pounds of coal. I am ready to undertake to build to-day one locomotive or 100 locomotives and guarantee a horse-power for two pounds of coal on the axle or on the drawbar behind the tender.

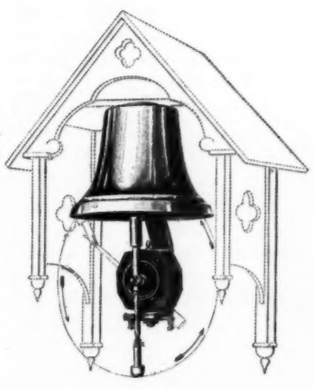
Now, when you come to talk about ordinary locomotive practice and what is possible in locomotive practice, and what has been demonstrated as thoroughly practical in locomotive practice, they are entirely two different things. Only two weeks ago, at a meeting of the Railroad Club in this room, this very subject was discussed. A paper by Professor Goss was read on the "Results of High Rates of Combustion in Locomotive Boilers," in which he demonstrated that fully 33 per cent of the coal in an ordinary locomotive goes out through the stack unconsumed; that is, where the grate area is about 21 feet, and where the rate of combustion is rushed up to 225 pounds, as I know on some roads it is the regular practice to-day to burn 225 pounds per square foot of grate area. That is entirely unnecessary, and boilers are running to-day in this country which are giving 10 pounds evaporation from a temperature of 212, on a locomotive, and there is no trouble in getting a temperature of 212 on a locomotive. There are abundant ways of using exhaust steam to give it, and it has been demonstrated thoroughly and practically that the water can be heated to that temperature on the engine. It has been demonstrated thoroughly and practically, and locomotives to-day are running in regular service that are giving a horse-power on 20 pounds of water—regular work, every day in the week, right along.

Twenty pounds of water on compound locomotives is not out of the way, and it can be reduced down to 17 and 18 pounds. Now, our friend here gives us, for this branch of the consolidated road, 2.95 as regular consumption for electrical horse-power in the station. Now, that is with one of the best engines—you know, the Green engine. That is one of the best engines there is in the market to-day. You can not beat it very much when it comes to giving the greatest efficiency for a given steam pressure. Now, we all know, Dr. Emery states in his paper that we can not expect more than 50 per cent of that on the axle from the motor, after he had gone through all this immense expenditure to get it there. You can not get more than 50 per cent on the axle; so that that engine must necessarily have used in the neighborhood of six pounds of coal per horse-power, developed on the axle on the car. Now, to give you an idea of what you have to contend with—I am not saying this to discourage you at all (laughter); in fact, I have been through the mill myself; I know how it is to make inventions and how difficult it is to introduce an invention after you have demonstrated that it is all right. If I were to go to the New York Central with a bond of $1,000,000, and offered to save one-half of their coal and give them their locomotives if they would give me one-half the saving for five years, they would not listen to me; they would not listen to anybody else. It would not make a bit of difference. They would say: "If you can give us something cheap, that won't cost anything more than we have got to pay, we will try it; but we won't spend any more money. This coal bill is a thing that is going all the time and might be distributed in dividends, but we won't spend any more money." That is the cry. You can not go and sell anything that costs any more money than they are paying. They want a cheap thing, and when you come down to getting efficiency, that is something that they don't think very much about. Now, to give you an idea of what you have got to contend with in the question of handling trains: One estimate here to-night is 500 horse-power as the average for a train. Now, as much as 10 years ago, I took a locomotive that I built for the Lehigh Valley road out over the western roads. On the Northern Pacific we took a 12-car train, from a dead stop, 10.8 miles in 11 minutes. I indicated the engine myself. She gave a mean effective pressure in the cylinder of 70 pounds in making 326 revolutions a minute, and indicated 1,810 horse-power on 1,848 square feet of heating surface and 60 square feet of grate area—30 horse-power per square foot of grate area and nearly a horse-power for every square foot of heating surface in the boiler. That engine, on the Fort Wayne road, took a 10-car train from Fort Wayne to Chicago, making 23 stops and five slow-downs. The running time for the whole distance was one mile per minute. She ran from a dead stop to a dead stop and made a crossing stop in eight minutes with that train, which weighed, including the engine, over 500 tons. Now, when you have to pick up a load of that kind and run with it and stop again, it requires more power than any electric locomotive could give with the same weight. Talk about the weight on the drivers; that engine had all the weight on the drivers she could utilize, and she gave a drawbar pull of 20,000 pounds. An ordinary train does not require to pull it, after it is started, more than 1,000 pounds to the car, so that 20,000 pounds adhesion is all any engine can utilize. She would slip her drivers in starting. But by carefully starting, she has all the adhesion she can utilize. That engine pulled up an 86-foot grade, from St. Paul to Minneapolis, a 14-car train of cars that weighed on an average of 85,000 pounds a car. The engine itself and tender weighed 100 tons. Now, that was a drawbar pull of 23,500 pounds. I took indicator cards, figured the work done on the drawbar, and it was 23,500 pounds pull on the drawbar, which was about one-fourth the weight on the drivers—a little more than one-fourth the weight.

(To be continued.)

A "Turret" Motor Bell.

The accompanying illustration represents the new "turret" motor bell made by the General Electric Company, of London, and described in the *Electrician*. The clapper of this bell moving in a complete circle each time the gong is struck, a great impetus is obtained, with the result that the blow is much heavier, and consequently a much louder ring is produced; besides which, the time



A "Turret" Motor Bell.

taken for the clapper to revolve gives the gong an opportunity of vibrating freely before it is again struck, so that a clear ring is produced, instead of the discordant rattle so frequently heard from electric bells. The motor used is said to be absolutely reliable, and is inclosed in a cast-iron box with self-oiling bearings. The diameter of the gong is 10½ inches, and the electro-motive force required is four and one-half volts, and the current about two amperes. There is a form of "turret" motor bell suited to work with 60, 100 or 110 volts circuits. This should be very useful in country houses as burglar, fire or other alarms, and is most convenient, as well as cheap, saving the cost and bother of batteries by working directly from the house mains.

The Electrical Trades Association.

The above-named organization was formed in this city last March, and has been in successful existence since. The annual meeting was held at the Astor House, December 4, and owing to the work done and the benefit derived from the association, it was voted to increase the initiation fee to $50 after January 1, 1897. The membership is already quite extensive and representative.

Havana Won't Pay for Electric Lights.

The Spanish-American Light and Power Company, whose office is at 113 Wall street, New York city, and plant in Havana and Mantanzas, Cuba, is having a hard time on account of the war in Cuba, says the New York *Sun*. It is a New York State corporation, incorporated in 1883, with a capital stock of $4,000,000, and represents a consolidation of five gas and electric light companies in Cuba. It had a monopoly of the gas and electric lighting in Havana and Mantanzas, and before the war broke out its gross earnings, it is said, reached about $1,000,000 a year. Since then these have been considerably reduced, and the company is behind on its interest payment to bondholders, but has been paying up as fast as it could get the money. It was disclosed on December 7, in the appointment of a receiver for Benjamin Giberga, who had been secretary of the company for a while, but who had resigned on December 1, that the company had defaulted on the interest due on November 1. The trouble, it is said, is due to the unsettled condition of affairs in Cuba, and particularly to the fact that the city of Havana won't pay what it owes the company for light. The amount is said to be $300,000. The works of the company in Havana are in operation without interruption. Expenses have been cut down as much as possible. Earnings have been greatly reduced, as many of the wealthy citizens have left the city, and payments are made to the company by its customers in paper money, which is at a discount. But the company would be all right if the city of Havana would pay up. In the meantime, friends of the company are trying to arrange with the bondholders, and the latter have been asked to accept a reduction of interest from four to three per cent on a part of the bonds. The president of the company is Walter S. Johnson and the treasurer, Henry P. Booth.

Heavy Trolley Damages.

The Court of Appeals has affirmed the decision of the lower courts in the suits brought by John S. Tholen against the Brooklyn Heights Railroad Company for damages for injuries sustained by his six-year-old daughter Annie, who was run over by a trolley car in Brooklyn, N. Y., and also for damages growing out of the loss of her services. The total amount of damages was $34,000.

Another Industry To Locate at Niagara Falls.

The Albright & Wilson Electro-Chemical Company, of Great Britain, has closed a contract with the Niagara Falls Power Company, and will locate at Niagara Falls, N. Y.

A man at Lynchburg, Va., has adopted the commercial *nom de plume* of "Jack the Fixer." He advertises himself as a "mender of any and everything," and will do "electrical work of all kinds."

GENERAL NOTES.

The Englewood Electric Light Company, of Englewood, N. J., has begun to supply electric current to its customers, under the management of Samuel F. Gold, superintendent of the Bergen County Gas Light Company.

The West End Street Railway Company, controlling the street railway companies of Boston and several suburban cities have, it was announced on December 8, leased the subway now being constucted in Boston city by the Transit Commissioners.

The Trumbull, Ohio, Electric Street Railway Company management is about ready to close contracts for an outfit of 35-horse-power motors, which will be of Westinghouse or General Electric or some other make. Besides fitting up the present cars, the three new cars to be added next Spring will be similarly equipped.

Secretary George F. Porter, of the National Electric Light Association, recently issued the bound volume report of the nineteenth convention of the National Electric Light Association, held in New York city, May 5, 6 and 7, 1896. This is an especially interesting volume of the association's proceedings, as the convention was held during the Electrical Exposition. The report is from the press of the James Kempster Printing Company, of New York city, and is excellent in every way.

Northwestern Electrical Association.

The following is a list of the papers to be read and discussed at the fifth annual convention of this association, to be held in Milwaukee, commencing on January 20, next: "Incandescent Lamps," by F. S. Terry, Chicago; "Protective Devices for Transformers," by H. C. West, Schenectady, N. Y.; "Gaseous Fuel as a Means of Cheapening Electricity," by Nelson W. Perry, New York; "Transformers," by O. M. Ash, Elkhart, Ind.; "The Garfield Park Electrical Plant," by Foree Bain, Chicago; "Roentgen Ray Phenomena" (illustrated), by Caryl D. Haskins, Boston; "Electrical Construction Affecting Insurance," by Geo. S. McLaren, Milwaukee; "Safety Devices for Electrical Circuits," by Prof. W. M. Stine, Chicago; "Electrical Supplies," by W. W. Low, Chicago.

KIND WORDS.

MUST HAVE THE "REVIEW."

To the Editor of Electrical Review:

Please find inclosed a money order for your valuable paper. Can't afford to be without it.

W. H. Thompson.

December 6.

The Boston Edison Company Increases Its Capital.

At a special meeting, on December 10, of the stockholders of the Edison Electric Illuminating Company of Boston, it was voted to increase the capital stock $500,000, from $3,420,000 to $3,920,000.

ADVANCE INFORMATION

Valuable News and Tips for Manufacturers and Dealers.

We publish below information relating to new electric railways, new electric light companies, new telephone companies and projected electric construction of all kinds. Every reader will find these columns of special interest, and manufacturers and supply houses will receive many valuable suggestions looking to new business by carefully watching this department in the ELECTRICAL REVIEW.

New Electric Railways.

SANTA ROSA, CAL.—N. W. Griswold and others have been granted franchise for the construction of a new electric line.

KAUKAUNA, WIS.—Steps are being taken to organize a company to build a new electric line from Oshkosh to Kaukauna.

BOSTON, MASS.—Under the name of the Safety Electric Railway Company, Myron J. Ferren, Walter S. Keen, Frank E. Orcutt and A. W. Barrett have petitioned for an act authorizing them to construct, maintain and operate an elevated railway in this place, and in cities and towns within a radius of five miles.

MEDFIELD, MASS.—The Norfolk Central Street Railway asks authority to extend its line in this town and Dover.

PLAINFIELD, N. J.—The Plainfield Street Railway Company has decided to extend its line from Somerset street to the Mountain Park Inn, on Watchung Mountain, next Spring.

JEFFERSONVILLE, N. Y.—The project to build an electric road from this place to Liberty is being strongly agitated, and Jeffersonville people have already subscribed $6,000 of the $25,000 needed.

SPRINGFIELD, CT.—Surveys are being made for the proposed electric line from this place to Suffield. The line will run on the east side of Crooked Lane and the east side of North Main street to Suffield Center, thence to West Suffield.

EUREKA SPRINGS, ARK.—The City Council of Pierce City, Mo., has granted a franchise for right-of-way and terminals of the Pierce City & Monett Electric Railway. Ex-Governor Fishback, of Arkansas, is a prominent stockholder.

ST. LOUIS, MO.—A bill authorizing the Shaw Avenue Electric Railway Company, a new corporation, to lay and operate an electric railway along Shaw avenue, from Grand to King's Highway and then north along the latter thoroughfare to New Manchester road, has been introduced into the council. The franchise asked for is to expire January 1, 1925, and the company agrees to pay the city $500 per annum for the privilege.

Electric Light and Power.

BUCYRUS, OHIO.—The City Council has granted a franchise to John A. Schaber for an incandescent electric plant for this place.

THREE OAKS, MICH. — Electric lights are to be established here.

HAWLEY, PA.—A charter has been issued to the Hawley Electric Light and Power Company; capital, $50,000.

CENTRALIA, MO.—J. K. Fyfer, of Columbia, Mo., has franchise to erect an electric light plant in Centralia.

ARKANSAS PASS, TEX. — C. H. Sawyer can give information concerning construction of electric light plant.

PAOLA, FLA.—R. G. Blake, City Clerk, may give information concerning construction of an electric light plant.

BERLIN, N. H.—Steps are being taken to extend the Gorham electric light plant to Berlin.

LAKEWOOD, OHIO.—City engineer may give information concerning construction of proposed municipal electric light plant.

HEMPSTEAD, TEX. — Col. L. A. Ellis can give information concerning establishment of proposed electric light plant.

ST. LOUIS, MO. — The Imperial Electric Light, Heat and Power Company has been incorporated with a capital stock of $2,000. Andrew M. Sullin, Calvin W. Fitch and John H. Maxwell are the incorporators.

CAMDEN, N. J. — The Camden Lighting and Heating Company has awarded the contract for the erection of its new plant to Philip Annor, of Woodbury, N. J.

SANDWICH, MASS.—E. C. Bourne is contemplating putting in an electric plant, with the object in view of lighting the streets and buildings of this town.

NEW CASTLE, DEL. — The City Council is considering proposals to light the town by electricity. Definite action will be taken at the meeting next week.

DOVER, N. J.—A new electric light plant is being constructed.

COUNCIL, PA.—City Clerk can give information concerning proposed construction of an electric light system, with a capacity of 1,000 arc and 10,000 incandescent lights.

SPENCERVILLE, OHIO.—An electric light plant is in contemplation.

OXFORD, MASS.—A new electric light plant is being constructed, which will be finished before Spring.

CAMDEN, PA.—City Clerk can give information concerning erection of electric light plant.

PROVIDENCE, R. I.—Commissioner Smith can give information concerning establishment of an electric lighting plant at the Ernest street pumping station.

ORLANDO, FLA.—Mr. Hugbert, of Zellwood, contemplates the establishment of an electric light plant.

CRANSTON, R. I.—City Clerk can give information concerning electric light plant.

LANCASTER, PA.—City Clerk can give information concerning electric light plant.

BEEVILLE, TEX.—An electric light plant is to be erected.

LONGMEADOW, CT.—The Longmeadow Electric Light Company is now being organized. It is proposed to install a plant which will supply incandescent light for dwelling-houses and street lights.

LITTLE FALLS, N. Y.—The Little Falls Electric Light and Power Company and the Little Falls Gas Light Company have effected a consolidation.

LOVELAND, COLO. — The Parliamentary Law Club will discuss the question of bonding the town for money to put in an electric light plant at their next meeting.

New Telephone and Telegraph Companies.

CORINTH, N. Y.—J. H. Wood, of the Hudson River Telephone Company, has completed arrangements for the construction of a metallic circuit to this place, Palmer Falls and other villages in that section of the county. The work of setting poles, stringing wires, etc., will commence in the early Spring.

HORTON, KAS.—H. E. Edgerton, of Hiawatha, is circulating a petition in an effort to obtain sufficient subscribers to start a telephone exchange.

COLVILLE, ORE.—The Spokane & Rossland Telephone Company has completed 10 miles of its line between this place and Myers Falls. The work of construction will be pushed to Rossland and Spokane, and will be completed by Spring.

HARRISONVILLE, MO.—The Harrisonville Telephone Company will begin work next week on the extension of its line from Evansville to this city. It is proposed to connect all towns in this section of southern Illinois by an independent telephone system.

WOODWORTH, LA.—The Alexandria Telephone Company will construct a telephone line from this place to Forest Hill, which will give the latter place connection with Alexandria.

HALLETTSVILLE, TEX.—The telephone line is being extended in this direction from here to Moulton and in another to Weimar.

CENTRE, ALA.—The citizens of this place and the neighboring towns are raising subscriptions to aid in the building of a telephone line from Gadsden to Centre.

NORFOLK, VA.—The contract for the new telegraph line, from Cape Henry to Cape Hatteras, was let to Captain Dinkwater. It will be a copper wire. The distance is 107 miles.

ASBURY PARK, N. J.—Monmouth County Telephone Company has been incorporated to do business in all towns and villages in the county; capital stock, $100,000. This is the company which is more commonly known in Freehold as the Hudson County Telephone Company.

COLUMBUS, KAS.—The Columbus Telephone Company has filed a charter with the Secretary of State. The capital of the company is $1,500. The directors are N. F. Allison, J. O. Houx, C. A. McNeill, J. N. Dunbar, C. S. Huffman and H. A. LaRue.

New Manufacturing Companies.

DENVER, COLO.—The Colorado Electrical and Motor Company has been incorporated; capital, $5,000. Incorporators, G. W. Russell, Jr., Z. H. Shevart and Frederick Robbins.

SANTA FE, N. M.—The General Electric Development Company, of Bernalillo County, has been incorporated. Incorporators, Harry D. Johnson, Edward A. Pearson and John Tascher. Capital stock, $250,000. Directors, Harry D. Johnson, Edward A. Pearson, John Tascher, Wallace Hesseldon and Edward Dodd, of Albuquerque; and John S. Pearson and James Franklin, of Philadelphia. Principal place of business, Albuquerque.

BINGHAMTON, N. Y.—The Star Electric Company has been incorporated with a capital of $100,000. The directors are G. S. Beach, Clarence E. Beach, Samuel H. Chant and Herman V. Doughty, of Binghamton.

Increase of Capital.

AUGUSTA, ILL.—The Western Illinois Telephone Company has increased its capital stock to $50,000.

HAMILTON, OHIO—The Miami Valley Traction Company has increased its capital stock from $10,000 to $650,000.

Business Troubles.

PHILADELPHIA, PA.—Judge Dallas, in the United States Circuit Court, appointed W. B. Given, of Columbia, as receiver of the Pennsylvania Traction Company, of Lancaster County.

"BRIDGING" BELLS

REWARD!

The undersigned will pay rewards for proof of use, prior to August, 1888, of bridging bells in telephones of the so-called "Carty" style. A reward of $50 will be paid for the first information and proof; a reward of $25 for the second; $25 third, and $10 fourth. Informants should give, as fully as possible, proof as follows:

Place Bridging bells were used.

Resistance of ringer magnets.

Method (drawing) of circuit connections.

Name of manufacturer.

Name of user.

Month and year (and day of month, if certain,) seen in use.

Names of as many persons who can testify to same as possible.

Names of informants will be kept secret, unless they are willing to be known.

A further reward of $100 will be given for sufficient information to prove, and of $100 additional for proof positive, that the "Carty Bridging Bells" were manufactured by the Western Electric Company prior to August 16, 1888.

All communications should be addressed to undersigned,

J. E. KEELYN.

250 South Clinton St.,
Chicago, Ill.